MDOT
Michigan Department of Transportation

OFFICE MEMORANDUM

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TO: Region Engineers
Region Associate Delivery Engineers
Region Construction Engineers
Resident/Project Engineers/TSC Managers

FROM: C. Thomas Maki
Chief Operations Officer

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SUBJECT: Bureau of Highway Instructional Memorandum 2000-03
Ride Quality on 2 Course Bituminous Overlays

The purpose of this memo is to alert department staff and contractors of a new special provision to be used on state bituminous projects with two course overlays during the 2000 construction season. The attached Special Provision for Ride Quality on 2 Course Bituminous Overlays measures the percent improvement of Ride Quality (RQ) on the finished surface as compared to the original surface.

A contractor may be eligible for an incentive payment of up to $0.75 per square meter by meeting the full bonus requirements of the provisions.

The contractor will be required to measure the original and final surfaces to determine the percent improvement in RQ. Measurement of the original and final surfaces will not be paid for separately.

Previously the following are the types of bituminous projects that included ride quality requirements:

1. Bituminous overlays with three courses or two courses over crush and shape that are at least 1.0 km in length.

2. Capital Preventative Maintenance projects involving single course bituminous overlays (with or without milling) have final minimum RQ at 80 percent of the original pavement RQ (20 percent improvement) as part of the warranty initial acceptance.

3. Five year warranty overlay projects also have the 20 percent improvement requirement, unless greater improvement is specified.

The attached special provision will apply to a majority of projects that are two course overlays, with or without cold milling, and will assure ride quality improvement. Projects let prior to the issuing of this special provision will not include this requirement.

If you have any questions or comments, please contact Mike Frankhouse at 517-322-5672.

Chief Operations Officer

Chief Engineer/Deputy Director
Bureau of Highway Technical Services

BOHTS:C/T:MF:kab

Subject Index: Bituminous

Attachments

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MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
RIDE QUALITY ON 2 COURSE BITUMINOUS OVERLAYS

a. Description.-This specification provides for an incentive payment to the Contractor for constructing the smoothest riding pavements possible. Two methods of measuring the ride quality of bituminous pavements are presented. The Contractor has the option of using either method. Once a method has been selected by the Contractor, it may not be changed without authorization from the Engineer. The ride quality of bituminous pavements will be determined on the original pavement before work starts and on the finished surface. Where Ride Quality applies this special provision deletes paragraph four of Subsection 502.03A4 and Subsection 502.03H of the 1996 Standard Specifications for Construction. However, where areas are excluded from ride quality, at the Point of Beginning (POB)/Point of Ending (POE) and other areas that connect to existing pavement, such as ramps, Subsection 502.03.H shall apply. In addition, for all other courses of bituminous pavements where ride quality is not required, all parts of Section 502 shall apply.

b. Methods of Determining Pavement Smoothness.-

1. California Type Profilograph

   Ride quality of the pavement, expressed in mm/km, will be determined by the Contractor from a mechanically produced profilogram (trace) or from a computerized version of the California type profilograph in accordance with Michigan Test Method MTM 725.

2. GM Type Rapid Travel Profilometer

   Ride quality of the pavement, expressed as RQI (Ride Quality Index) units, or mm/km will be determined by the Contractor by proper reduction of the true profile obtained by a GM Type of Rapid Travel Profilometer in accordance with Michigan Test Method MTM 726. The Contractor has the option of using either unit of measurement.

c. Equipment.-The Contractor will certify in writing that the equipment, manufacturer's calibration procedures and visual inspections are in compliance with this special provision and the applicable Michigan Test Method.

d. Method of Testing.

1. Ride Quality Measurement Plan:

Testing will be done in accordance with Michigan Test Method MTM 725 or MTM 726. The Contractor will submit a written Ride Quality Measurement Plan to the Engineer for review and approval prior to the start of paving operations. The Contractors plan will include, but not be limited to calibration schedule, the length of the official test run, proposed excluded areas, method of traffic control, and the testing time frame in relation to paving operations. The Contractor is responsible for any pavement cleaning prior to measurement of Ride Quality. Areas of ramps, tapers, bridge decks, and railroad crossings are not included under the item of Ride Quality. (See Figure 1.) Major intersections (at grade) with part width, maintained traffic, or staged construction may be considered as excluded areas as listed in the Ride Quality Measurement Plan. The excluded area will extend between the approach and departure spring points of the intersection. Note in urban areas that Drainage Covers may be within wheel path of profilometer, thus these areas should be excluded and noted in the Contractors Ride Quality Measurement Plan.

Where extreme bumps or dips exist in the original pavement and the contract does not include pay items for this type of repair work, the Contractor shall notify the Engineer of these concerns prior to start of paving.

2. The Engineer will review and approve the Ride Quality Measurement Plan.

The Contractor will mark the limits for Ride Quality Measurement including the POB, POE, and any excluded area as specified in the approved Ride Quality Measurement Plan.

The Contractor will notify the Engineer a minimum of 24 hours prior to any pavement corrections and determination of ride quality. Also, the Contractor will be responsible for laying out bump grinding areas required in the Ride Quality Measurement Plan. The Contractor will verify the locations and extent of the bump using a profilometer, and will verify the removal of the bump after grinding.
The run will not be considered an official run until the pavement profile is in compliance with the requirements for this special provision.

Profiles will be taken 1 m from each side of each lane that is to be measured. Bridge decks will be excluded for payment of Ride Quality, but not for Ride Quality Measurement. All damage to the pavement surface caused by the profilometer will be repaired at no cost to the Department.

e. Method of Interpretation.-

1. Profile Index (mm/km)

Data will be interpreted in accordance with Michigan Test Method MTM 725.

The profile index, in mm/km, will be calculated for each 160 m segment. Segments less than 160 m shall be prorated to a 160 m segment. Each run will be reported by the Contractor to the nearest 0.5 mm as the average mm/km of the two runs for each lane.

Surface pavement lanes constructed within the limits shown in Table 1 or 2 may result in incentive payment of varying percentages or not be eligible for any bonus payments for ride quality. Any surface 160 m segments that are greater than 80% of the original ride quality will require correction .

2. Ride Quality Index (RQI)

RQI will be calculated for each 160 m segment. Segments less than 160 m will be computed as partial segments at the beginning and end of excluded sections and at the end of a run. The RQI for each run will be reported, to one decimal place (e.g., 48.6), as the average of the two runs for each lane.

Surface pavement lanes constructed within the limits shown in Table 1 or 2 may result in incentive payment of varying percentages or will not be eligible for any bonus payments for ride quality. Any surface 160 m segments that are greater than 80% of the original ride quality will require correction.

f. Methods of Correction.-

1. Surface drainage will not be impaired as a result of diamond grinding.

2. Bituminous Pavements.-Corrections to the pavement will be by one of the following methods:

   a. Diamond Grinding
   b. Cold Milling (Not allowed on surface courses)
   c. Wedging (Not allowed on surface courses)
   d. Removal and replacement of a minimum of 35 mm of bituminous a full lane width by the length required (a minimum of 30 m)

   For Top course bituminous pavements, the entire ground area shall be covered with a fog seal when grinding is complete and cured before the pavement is open to traffic. The area of fog seal shall be a neat rectangular area of uniform application covering only the ground area.

g. Method of Measurement.-The item of RIDE QUALITY MEASUREMENT-BITUMINOUS will be measured as Lane Kilometers for the original pavement and finished surface course. The limits for Ride Quality Measurement will be based on 5 m before the POB and after the POE. This distance shall be verified by the Contractor's initial Ride Quality Measurement and will be the length used throughout the Ride Quality Measurement Plan. (See Figure 1.)

Quantities for the item **Ride Quality-Bituminous** will be determined by the area in square meters based on plan quantities or known changes. This distance shall be verified by the Contractor's initial Ride Quality Measurement and will be the length used throughout the Ride Quality Measurement Plan. The limits for Ride Quality will be based on 5 m after the POB and before the POE.

Quantities for the item **Bump Grinding** will be determined by the area in square meters, outside the limits of **Ride Quality**, as directed by the Engineer. See Figure 1.

h. Basis of Payment.-

Contract Item (Pay Item)	Pay Unit
Ride Quality-Bituminous	square meter
Bump Grinding	square meter

Ride Quality Measurement will not be paid for separately but will be considered as having been included in the contract unit prices bid for other contract items.

No additional payment will be made for runs made by the Contractor to determine the smoothness prior to corrections for the official runs.

Payment will be determined by the Engineer for the item **Ride Quality-Bituminous** based on the mm/km or RQI for the final weighted average for all values within each lane. The limits for **Ride Quality** will be based on 5 m after the POB and before the POE and 5 m before and after any excluded area. Each lane will be determined individually.

Payment will be made at the contract unit price for **Ride Quality-Bituminous** on the finished surface. Incentive pavements will be based on the percent improvement of mm/km or ride quality index on the finished surface compared to the original surface. The criteria for determining incentive payments will be based on the percentage in Table 1 or 2, the contract price and the pavement area.

Payment for the item, **Bump Grinding** will be excluded within the limits of **Ride Quality-Bituminous**. Areas outside these ride qualities will meet the smoothness requirements. All new pavement will be eligible for payment of **Bump Grinding** if it meets the smoothness requirements in Section 502.03H of the 1996 Standard Specifications for Construction.

RIDE QUALITY - BITUMINOUS
RIDE QUALITY MEASUREMENT
BUMP GRINDING

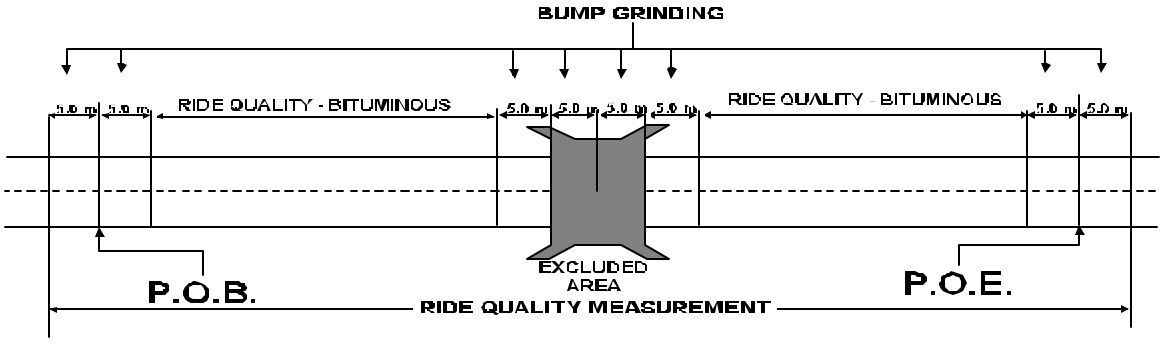

FIGURE 1

TABLE 1
For Existing Pavement with Ride Quality (mm/km) ≤ 210 or RQI ≤ 70

Percent Improvement	Pay Factor
25 - 30	0 %
35	25
40	50
45	75
50	100

NOTE: If the final surface Ride Quality is > 75% of the original surface Ride Quality, then corrective action will be required.

TABLE 2
For Existing Pavement with Ride Quality (mm/km) > 210 or RQI > 70

Percent Improvement	Pay Factor
35 - 40	0 %
45	25
50	50
55	75
60	100

NOTE: If the final surface Ride Quality is > 65% of the original surface Ride Quality, and > (53 RQI or 160 mm/km) then corrective action will be required.